Particle Movement in a Centrifugal Device with Vertical Blades

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The particle movement parameters in a centrifugal scattering device (conical disk with vertical rectilinear blades) are determined in the article using a movable coordinate system, which rotates with the disk. The disk rotates with a given angular velocity around a vertical axis. Since a moving system's vertex describes a circle, such a system can be taken as the accompanying Frenet trihedron of this circle known in differential geometry. It allows finding the components of the particle's absolute acceleration in the projections on the trihedron's orts. A system of differential equations of particle motion is compiled and solved by numerical methods. Kinematic characteristics and the regularities of the relative movement of a particle on the conical surface were found. Analytical description of the particle movement allows investigating the particle's acceleration and finding the relative and absolute velocities at the moment of the particle's descent from the disk. As a result, determining the influence of technological and structural parameters on the particle's acceleration process is possible using obtained analytical dependencies.

Keywords: Differential Equations, Frenet Trihedron, Angular Velocity, Radius Vector, Acceleration.

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